RASEEV, S.

Hydraulics of the fluidized stratum. III. Experimental checking relative to compressible fluids, the apport of solid in the stratum being null. p. 295.

Academia Republici Populare Romine. STUDII SI CERCETARI DE CHIMIE. Bucuresti, Rumania. Vol. 6, no. 2, 1958.

Monthly List of East European Accessions (EEAI) Vol. 8, no. 7, July 1959.

Uncl.

RASEEV, S.

Institute of Petroleum, Gas, and Geology, an important factor in the development of the petroleum industry. p. 348.

PETROL SI GAZE. (Asociatia Stiintificia a Inginerilor si Technicienilor din Rominia si Ministerul Industriei Petrolului si Chimiei) Bucuresti Rumania. Vol. 10, no. 8, 1959.

Monthly list of East European Accessions (EEAI) LC Vol. 9, no. 2
Feb. 1960

Uncl.

RASEEV, Sergiu D.

Contributions to the study of fluidization. Rev chimie
7 no. 1: 439-447 '62.

1. Institut de Petrole, de Gas et de Geologie, Bucarest.

Z/056/62/019/007/004/007
I037/I237

AUTHOR: Ralejev, D.

TITLE: Kinetics of silicium binding by carbon steel

PERIODICAL: Přehled technické a hospodářské literatury. Hutnictví a strojírenství v. 19, no. 7, 423, abstract HS62-5369 (1961, Rev. Métall., Bucureşti, v. 6, no. 2, 179-190)

TEXT: Study of electrolytic silicization from a melt of SiO_2 and Na_2O. Study of silicization of the steel OLS 10 ST AS 880-49. The working current density is 0.6 A/cm^2 at temperature 1000, 1070, 1100 and 1150°C; for periods of 1-4 hours. The next step in silicization is done with a mixture of silicum carbide and 5-10% crystalline $FeCl_3$. The first proceeds by a diffusion mechanism, the second step is governed by a complex reaction of the interior layer with $SiCl_4$ as well as by diffusion. There are 1 microphotograph, 4 diagrams, 2 tables, and 10 references.

[Abstracter's note: Complete translation.]

Card 1/1

RASEK, J.

"A Screening Area as a Place to Fight for The Quality of Coal" p. 145
(Wiadomosci Gornicze, Vol. 4, No. 5, May, 1953, Katowice)

SO: Monthly List of East European Accessions, Vol. 3, No. 2, Library of Congress, February, 1954, Uncl.

RASENESCU, I., conf. ing.

The hydrocyclone principles of construction and dimensions.
Ind alim 14 no.10:406-412 O'63.

RASENESCU, I., conf. ing.

"Industrial microbiology" by D.Motoc. Reviewed by I.Rasenescu.
Ind alim 14 no.8:331 Ag'63.

RASENKOV, A. (g. Riga).

"Subtropics" in the window. IUn. nat. no.2:29 F '57. (MLRA 10:6)

1. Nauchnyy sotrudnik Nikitskogo botanicheskogo sada.
(House plants)

RASETA, I.

RASETA, I.; NAD, P. "Observations from examinations for the rank of major in the communication service."
Vojni Glasnik, Beograd, Vol 7, No 10, Oct 1953, p. 58

SO: Eastern European Accessions List, Vol 3, No 10, Oct 1954, Lib. of Congress

YUGOSLAVIA/Microbiology - Sanitation Microbiology. F-4

Abs Jour : Ref Zhur - Biol., No 15, 1958, 67216

Author : Savic, I., Raseta, J.

Inst : -

Title : Microbiology of Meat Products.

Orig Pub : Veterin. glasnik, 1957, 11, No 2, 174-179

Abstract : No abstract.

Card 1/1

YUGOSLAVIA / Chemical Technology, Chemical Products and Their E-28
Application. Food Industry.

Abs Jour : Ref Zhur - Khimiya, No 5, 1959, No. 17425

Author : Savic. I.; Rasota, J.
Inst : Not given
Title : Microbiology of Meat Products

Orig Pub : Veterin. glasnik, 1957, 11, No 2, 174-179

Abstract : Review article. Bibliography includes 5 titles.

Card 1/1

H-117

RASEV, M.; ZOGRAFSKI, B.; TOMOV, I.

Clinical investigations with the nicotine-free cigarettes Atrotabac. Nauch. tr. vissh. med. inst. Sofiia 43 no.3: 1-11 '64.

1. Chair of internal diseases at the Higher Medical Institute, Sofia (Director: Prof. M. Rasev).

RASEVIG, D.V., kand.tekhn.nauk

Overvoltage in transmission lines caused by a direct stroke of lightning. Izv.vys.ucheb.zav.; energ. 2 no.6:40-47 Je '59. (MIRA 13:2)

1. Moskovskiy ordena Lenina energeticheskiy institut. Predstavlena kafedroy tekhniki vysokikh napryazheniy.
(Lightning protection) (Electric lines)

RASHEV, D.; ROTARU, A.; REVNIC, I.; GHEORGHISOR, N.

Study of the wear of plastic materials in media of oil and water. Pt. 1. Bul Inst Petrol Rum no. 10:125-140 '63.

RASH, A.

29853

Avtomobil; - samosval GAZ-93. Avtomobil; 1949, No. 9, s. 16-17

SO: LETOPIS' NO. 40

RASH. A.

RASH, A.

Wrote about modernization of the Zis-5 automobile
Brake System.

USAF, "Treasure Island", on file in Library of Congress, Air Information Division,
Report No. 98556.

RASH, A.V., kandidat tekhnicheskikh nauk

The UralZIS-352 gas-generator truck. Vest.mash.35 no.8:19-21 Ag'55. (MLRA 8:10)

1. UralZIS
(Motor trucks)

SOV/124-58-2-2195

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 2, p 98 (USSR)

AUTHOR: Rasha, D. N.

TITLE: New Method for the Determination of the Permissible Loading of a Pile and the Determination of the Internal Friction of Loose Sands Covered With Water (Novyy metod opredeleniya dopustimoy nagruzki na svayu i opredeleniye ugla vnutrennego treniya rykhlykh, nakhodyashchikhsya pod vodoy, peskov)

PERIODICAL: Sb. tr. Gos. in-ta proyektir. na rechn. transp. Leningrad, 1956, pp 105-111

ABSTRACT: Bibliographic entry

Card 1/1

RASHA, D.N., inzhener.
[redacted]

Engineer IAtsenko and mechanic Romanov's vibrator drill. Rech.transp. 15 no.2:29 F '56. (Boring machinery) (MLRA 9:6)

14(10) SOV/112-59-3-4678

Translation from: Referativnyy zhurnal. Elektrotekhnika, 1959, Nr 3, p 54 (USSR)

AUTHOR: Rasha, D. N.

TITLE: Thermal Method for Soil Strengthening and Prospects for Its Application (Termicheskiy metod ukrepleniya gruntov i perspektivy yego primeneniya)

PERIODICAL: Sb. tr. Leningr. gos. in-t proyekt. na rechn. transp. L., 1957, pp 57-63

ABSTRACT: Bibliographic entry.

Card 1/1

SOV/124-57-9-10924

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 9, p 155 (USSR)

AUTHOR: Rasha, D. N.

TITLE: A Thermal Method of Soil Amelioration in the Foundations of Structures (Termicheskiy sposob uluchsheniya gruntov v osnovanii sooruzheniy)

PERIODICAL: V sb.: 15-ya nauch. konferentsiya Leningr. inzh.-stroit. in-ta, Leningrad, 1957, pp 90-91

ABSTRACT: Bibliographic entry

Card 1/1

RASHA, D.N., inzhener.

Overcome the difficulties of transportation on the new Angara reservoirs. Rech. transp. 16 no.4:31 Ap '57. (MLRA 10:5)
(Angara reservoirs--Inland navigation)

RASHA, Dmitriy Nikolayevich; SERGEYEV, L.A., otv. za vypusk; PUL'KINA, Ye.A., tekhn.red.

[Study and calculation of shore transformations in the lake section of reservoirs] Izuchenie i raschety pereformirovaniia beregov ozernoi chasti vodokhranilishch. Leningrad, M-vo rechnogo flota RSFSR, 1958. 81 p. (MIRA 12:12)
(Reservoirs) (Coast changes)

RASHA, D.

RASHA, D.N., inzh.

Building on artificially created terrains. Rech. transp. 17 no.2:31 F '58. (MIRA 11:2)

(Soil mechanics)

RASHA, D.N., inzh.

New method of determining allowable load on piles and the internal friction angle for loose sands. Rech.transp. 18 no.1:44-46 Ja '59. (MIRA 12:2)
(Piling (Civil engineering))

RASHA, D., inzh.

Using aqualungs in studying underwater parts of hydraulic structures. Rech. transp. 19 no. 6:57-58 Je '60. (MIRA 14:2)
(Diving, Submarine) (Hydraulic structures)

NERPIN, Sergey Vladimirovich, doktor tekhn. nauk, prof.; KOTOV, Aleksandr Ivanovich; RASHA, Dmitriy Nikolayevich; ZARKHI, A.Z., kand. tekhn. nauk, dots., retsenzent; MORARESKUL, N.N., kand. tekhn. nauk, dots., retsenzent; SHTENTSEL', V.K., red.; VOLCHOK, K.M., tekhn. red.

[Footings, basements, and engineering geology] Osnovaniia, fundamenty i inzhenernaia geologiia. Pod obshchei red. S.V. Nerpina. Moskva, Izd-vo "Rechnoi transport," 1963. 360 p. (MIRA 16:7)

(Engineering geology)

L 45067-66

ACC NR: AP6025984 (N) SOURCE CODE: UR/0310/66/000/007/0037/0038

AUTHOR: Rasha, D. (Chief geologist)

ORG: Lengiprorechtrans

TITLE: Versatile "VZOG" core lifter

SOURCE: Rechnoy transport, no. 7, 1966, 37-38

TOPIC TAGS: ~~drilling machine,~~ soil sampling machine, GEOLOGIC INSTRUMENT, ENGINEERING MACHINERY, STRATIGRAPHY

ABSTRACT: A versatile new core lifter designated "VZOG" [vacuum-forced-filling-and-shaking core lifter] has been designed by the author and V. Ya. Puzynya, a technician. It is equally suited for lifting monolithic, undisturbed formations of silt, sand, and soil with various degrees of cohesiveness. The core lifter is pressed into the soil and operates on the vacuum principle. The design is very simple, and it has no fragile elements. It is particularly useful for lifting samples of soft soils. A detailed description of the device if included. [SA] Orig. art. has: 1 figure and 1 table.

SUB CODE: 13, 08/ SUBM DATE: none/

UDC: 627.785.002

Card 1/1 blg

RASHAL, S., prepodavatel'

The search. Prof.-tekh. obr. 21 no.11:3-4 N '64 (MIRA 18:2)

1. Gorodskoye professional'no-tekhnicheskoye uchilishche No.4, Tyumen'.

RASHAP, B.Ya., kand.med.nauk (Kharkov)

Methods for studying the autonomic nervous system. Vrach.delo no.3:287-289 Mr'58 (MIRA 11:5)

1. Ukrainskiy nauchno-issledovatel'skiy institut ekspertizy trudosposobnosti i organizatsii truda invalidov.

(NERVOUS SYSTEM,AUTONOMIC)
(PHYSIOLOGICAL APPARATUS)

RASHAP, B.Ya.

[redacted]

New apparatus for studying the higher nervous activity in man. Fiziol.zhur. [Ukr.] 2 no.1:114-120 Ja-F '56. (MLRA 10:1)

1. Ukrains'kiy TSentral'niy naukovo-doslidniy institut ekspertizi pratsezdatnosti i organizatsii pratsi invalidiv, laboratoriya patofiziologii.
(PHYSIOLOGICAL APPARATUS)

RASHAP, B.Ya. (Khar'kov)

Comparative study of the results of a parallel investigation of dermal capillary resistance in peptic ulcer and hypertension. Vrach. delo no.8:137-138 Ag '61. (MIRA 15:3)

1. Ukrainskiy tsentral'nyy nauchno-issledovatel'skiy institut ekspertizy trudosposobnosti i organizatsii truda invalidov (TSIETIN).

(CAPILLARIES) (PEPTIC ULCER) (HYPERTENSION)

30977. RASHAP, B. YA., SHEVKO, A.D. AND SHOGAM, A. N.

Nekotorye fiziologicheski aktivnye veshchestva v krovi donorov. Trudy Ukr. psikhonevrol. In-ta, t. XXV, 1949, s. 31-36

RASHAP, B.Ya.

Method for the symmetrical study of capillary resistance and neurohumoral factors of the skin. Fiziol. zhur. 47 no.6:783-785 Je '61. (MIRA 15:1)

1. From the Ukrainian Institute for Working Capacity Expertise and Occupational Guidance of the Disabled, Kharkov.
(SKIN)

RASHAP, B.Ya., starshiy nauchnyy sotrudnik (Khar'kov)

Methods for investigating the vegetative nervous system in patients with an ulcer disease. Vrach. delo no.11:30-33 N '61.
(MIRA 14:11)

1. Ukrainskiy nauchno-issledovatle'skiy institut ekspertizy trudosposobnosti i organizatsii truda invalidov.
(NERVOUS SYSTEM, AUTONOMIC)
(STOMACH--ULCERS)

Рашап, Б.Я.

KAGAN, D.E., kandidat meditsinskikh nauk; RASHAP, B.Ya., starshiy nauchnyy sotrudnik

Investigations on the adrenergic and cholinergic activity of the blood and urine in peptic ulcer. Terap.arkh. 29 no.4:27-30 Ap '57. (MIRA 10:10)

1. Iz Ukrainskogo tsentral'nogo nauchno-issledovatel'skogo instituta ekspertizy trudosposobnosti i organizatsii truda invalidov.

(PEPTIC ULCER, physiology,
adrenergic & cholinergic substances in blood & urine (Rus))
(SYMPATHOMIMETICS, determination,
in blood & urine in peptic ulcer (Rus))
(PARASYMATHOMIMETRIC, determination,
same)

31074. KASHAP, B. YA. AND SHOGAM, A. N.

O metodike issledovaniya fraktsionnoy kholinesteraznoy aktivnosti spinnomozgovoy zhidkosti pri nervnopsikhicheskikh zabolevaniyakh. Trudy Ukr. psikhonevrol. in-ta, T. XXV, 1949, s. 100-04

RASHAP, B.Ya., starshiy nauchnyy sotrudnik (Khar'kov)

Stomach function and leucocytosis of the peripheral blood in peptic ulcer. Vrach.delo no.4:437 Ap '60. (MIRA 13:6)

1. Ukrainskiy nauchno-issledovatel'skiy institut trudosposobnosti i organizatsii truda invalidov.
(PEPTIC ULCER) (LEUCOCYTOSIS)

RASHAP, M.M., master otdelochnykh rabot Glavpromstroya; MARKIN, A., redaktor;
KARPINOVICH, Ya., tekhnicheskiy redaktor.

[New method of finishing imitation marble (on an oil putty base)]
Novyi sposob otdelki pod estestvennyi mramor (na osnove maslianykh
mastik). Minsk, Gos. izd-vo BSSR, Red. nauchno-tekhn. lit-ry,
1951. 41 p. (MLRA 8:2)

1. Glavpromstroy.
(Plastering)

1. M'TEYEV, A.L., Prof.: RASHAP, Ye A., Engineer.

2. USSR (600)

4. Bearings (Machinery)

7. Standardizing the consumption of electric power in the production of bearings. Podshipnik no. 10. 1952.

9. **Monthly List of Russian Accessions**, Library of Congress, February 1953. Unclassified.

1. MATVEYEV, A. L., Prof.; RASHAP, Ye. A., Eng.

2. USSR (600)

4. **Electric** Power

7. Standardizing the consumption of electric power in the production of bearings, Podshipnik, No. 10, 1952.

9. Monthly List of Russian Accessions, Library of Congress, February 1953. Unclassified.

30946. RASHAT, B. YA.

O roli neyrogumoral'nykl izmeneniy pri otravlenii tetraetilsvintsom. Trudy Ukr. psiklonevrol, In-ta, T. xxv, 1949, s. 81-91

30942. RASHAT B. YA.

Neyrogumoral'nye faktory v Patogehze ahafilakticheskogo shoka. Trudy ukr. Psikhonevrol. In-ta, T. xxv, 1949 s 17-23.

RASHAUSKENE, L.P., Cand Tech Sci--(diss) "Study of a compensation-type device for the determination of the angle of losses in dielectrics." Kaunas, 1958. 14 pp with drawings (Min of Higher Education USSR. Kaunas Polytech Inst), 140 copies (KL, 27-58, 109)

RASHBA, A. Ya.

see RASHBA, Ye. Ya.

KAGANOV, M.; MIKHAYLOV, I.; RASHBA, E.

Eighth All-Union Conference on Low Temperature Physics. Usp. fiz. nauk 77 no.2:353-367 Je '62. (MIRA 15:6)
(Low temperature research--Congresses)

L 21745-65 EWT(l)/EWG(k)/T/EWA(h) Pz-6/Peb IJP(c)/AFWL/BSD/ASD(a)-5/
ESD(t) AT

ACCESSION NR: AP5002308 S/0053/64/084/004/0557/0578

AUTHOR: Rashba, E. I.

B

TITLE: Combined resonance in semiconductors 21

SOURCE: Uspekhi fizicheskikh nauk, v. 84, no. 4, 1964, 557-578

TOPIC TAGS: combined resonance, semiconductor, spin orbit interaction, band carrier, bound carrier, crystal symmetry

ABSTRACT: Combined resonance is defined as the result of the coupling of configurational and spin motions of electrons, such that spin transitions can be excited by the electric component of the electromagnetic field and orbital transitions can be excited by the magnetic component. Combined resonance was initially investigated by the author (FTT v. 2, 1224, 1960) for band carriers; the present paper is devoted to an exposition of the theory of combined resonance by band carriers in crystals of different types, and to an analysis of the first experimental data. It is shown that in many cases, particularly in crystals without inversion centers, the combined resonance intensity should exceed the paramagnetic resonance intensity, in some cases by many orders of magnitude.

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L 21745-65

ACCESSION NR: AP5002308

O

The paper deals also with a study of the possibility of combined resonance of bound carriers. It is shown by a detailed analysis that combined resonance with bound electrons should actually exist, but under ordinary conditions it is much weaker than resonance with band carriers, because of the smallness of the radius of the center compared with the radius of the orbit. It is shown, nevertheless, that in some cases the combined resonance at local centers can become commensurate in intensity with paramagnetic resonance, or even larger. The subject headings are: 1. Influence of spin-orbit interaction on resonance effects. 2. Combined resonance with band carriers (general analysis). 3. Combined resonance with band carriers in crystals with different symmetry. Discussion of the first experimental results. 4. Combined resonance with bound carriers (general analysis). 5. Combined resonance with local centers of various types. Orig. art. has: 5 figures and 35 formulas.

ASSOCIATION: None

SUBMITTED: 00 ENCL: 00 SUB CODE: SS

NR REF SOV: 023 OTHER: 018

Cord 2/2

RASHBA, E.I. [Rashba, E.Y.]

Various cases of origination of toroidal isoenergetic surfaces in semiconductors. Ukr. fiz. zhur. 8 no.10:1064-1074 O '63. (MIRA 17:1)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

L 11430-65 EWG(j)/EWA(k)/FBD/EWT(1)/EEC(k)-2/EEC(t)/T/EEC(b)-2/EWP(k)/
EWA(m)-2/EWA(h) Pn-4/Po-4/Pf-4/Pi-4/Pl-4/Peb IJP(c)/ESD(t)/ASD(d)/BSD/
AS(mp)-2/ESD(gs)/AFWL/RAEM(a)/ASD(a)-5/SSD/AFETR/RAEM(c) JHB/WG

ACCESSION NR: AP4046648 S/0181/64/006/010/3178/3179

AUTHOR: Rashba, E. I.

8

TITLE: The possibility of using Raman resonance to obtain laser action 21

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3178-3179

TOPIC TAGS: laser, 25 laser action, Raman effect, Raman resonance, semiconductor laser, Raman laser, population inversion Raman scattering

ABSTRACT: The principle of a pulsed semiconductor laser based on the Raman resonance effect, i. e., on the existence of electric dipole transitions with a change in the spin orientation predicted by the author for band carriers and by N. Bloembergen for local centers, is discussed. In the quantum limit practically all of the band electrons are concentrated in the lower Landau level with a preferred (lower) spin orientation (0,-). It is assumed that the spin relaxation time $\tau_s \gg \tau$, where τ is the relaxation time without a change in the spin state. If a strong electric field is turned on for a period of time

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L 11430-65
ACCESSION NR: AP4046648

t so that $\tau<<t<<\tau_s$, then during the duration of the pulse the temperature in the system of electrons with the lower spin will increase, At the same time there will be practically no electrons with the higher spin. In such a case an inverted population will be attained between a series of levels, for example (0,+) and (1,-). Since radiative transitions with simultaneous change of coordinate and spin quantum numbers, including such as (1,-) (0,+) are allowed, conditions favorable for emission are created. Conditions for emission are also fulfilled in other cases. For example, in the absence of current the electrons obey Bolzmann distribution with temperature T_0. When a pulse is applied, the temperature of each of the spin subsystems reaches T. In this case the condition for an inverted population between (n,+) and (n+1,-) is

$$T/T_0 > \omega_c/\omega_s ,$$

where ω_c and ω_s are frequencies of the cyclotron and spin resonance, respectively. If in the absence of current an electron gas with a chemical potential ζ is degenerate with $\zeta>>\hbar\omega_c$, but obeys Boltzmann

Card 2/4

distribution during application of the pulse, then the condition for emission is

$$kT/\zeta > 2\omega_c/3\omega_s.$$

Both of these criteria are easily fulfilled. However, there are also more rigid criteria due to the fact that the transitions under consideration are in the same spectral region as the cyclotron transitions. In the presence of strong magnetic fields, a case to which this analysis is limited, the transitions discussed are considerably weaker than cyclotron transitions. Therefore, laser action can be attained only for large $\omega\tau$, when the bands are practically separated. The possibility of utilizing such a system as a phonon laser is noted. Orig. art. has: 2 formulas.

ASSOCIATION: Institut poluprovodnikov AN SSSR. (Institute of Semiconductors, AN SSSR).

L 11430-65
ACCESSION NR: AP4046648

SUBMITTED: 26May64 ATD PRESS: 3118 ENCL: 00

SUB CODE: SS,EC NO REF SOV: 006 OTHER: 009

Card 4/4

L 14424-65 EWT(1)/EWG(k)/T/EWA(b) Pz-6/Peb IJP(c)/SSD/AFWL/ASD(a)-5/
AFETR/ESD(t) AT
ACCESSION NR: AP4048395 S/0181/64/006/011/3247/3250

B

AUTHOR: Rashba, E. I.

TITLE: Singularities in the flow of electric current through an intrinsic anisotropic semiconductor 21

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3247-3250

TOPIC TAGS: semiconductor, carrier density, electric conductivity, carrier mobility, resistivity

ABSTRACT: It is shown that when direct current flows through a bounded intrinsic anisotropic semiconductor the carrier density in the semiconductor deviates from the equilibrium value, with depletion of carriers occurring in some regions and enrichment in others. Inasmuch as the average density of the carriers of either polarity remains constant, the resultant deviation from equilibrium resistivity is connected not with the change in the number of carriers but with

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L 14424-65
ACCESSION NR: AP4048395 /

the change in their distribution. The resistance of the sample depends essentially on the lifetime of the non-equilibrium carrier, and deviations from Ohm's law arise when the field has the same order of magnitude as the diffusion field. The voltage-current characteristic has the form of two straight-line segments, the slope of which changes at a field intensity close to 3 V/cm. The effect is governed by the difference between the relative anisotropies of the electron and hole mobility tensors, and is physically related to the singularities in the thermoelectric properties of anisotropic semiconductors and to the deviations from equilibrium carrier density occurring in measurements of the Hall effect. Orig. art. has: 2 figures and 15 formulas.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 09May64 ENCL: 00

SUB CODE: SS NR REF SOV: 001 OTHER: 001

Card 2/2

ACCESSION NR: AP4011751 S/0181/64/006/001/0141/0152

AUTHORS: Rashba, E. I.; Sheka, V. I.

TITLE: Combination resonance at local centers of large radius

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 141-152

TOPIC TAGS: combination, combination resonance, band carrier, band electron, transverse resonance, longitudinal resonance

ABSTRACT: The authors have developed a theory on combination resonance at large-radius donor centers. They note that the conditions for combination resonance to arise are not as favorable under these circumstances as for band electrons. Combination resonance is excited by the electron vector of electromagnetic waves and is therefore proportional to the square of the radius of the electron orbit. The authors have shown that combination resonance must be observed in transverse circular polarization and in longitudinal polarization. The resonance intensity depends markedly on the angle between the steady uniform magnetic field and the symmetry axis. In this, the angular dependence coincides with the value obtained by E. I. Rashba and V. I. Sheka (FTT, 3, 2369, 1961) for band carriers. Two cases

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ACCESSION NR: AP4011751

were considered: for transverse resonance and for longitudinal resonance. It was found that transverse resonance for $g > 0$ is markedly different from transverse resonance with $g < 0$ and from longitudinal resonance. In the first ($g > 0$), resonance intensity is limited, but in the other two the magnetic field becomes infinite. Orig. art. has: 4 figures and 45 formulas.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiyev (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 17Jul63 DATE ACQ: 14Feb64 ENCL: 00

SUB CODE: PH NO REF SOV: 007 OTHER: 008

Card 2/2

ACCESSION NR: AP4013524 S/0181/64/006/002/0576/0583

AUTHORS: Rashba, E. I.; Sheka, V. I.

TITLE: The theory of combination resonance at acceptor centers

SOURCE: Fizika tverdogo tela, v. 6, no. 2, 1964, 576-583

TOPIC TAGS: combination resonance, indium antimonide, spin orbit splitting, deformed crystal, acceptor center

ABSTRACT: This article is a continuation of previous work by the authors (FTT, 6, 141, 1964), in which they analyzed the factors affecting intensity of combination resonance at local centers of large radius. In the present paper they determine the intensity values and derive angular diagrams for combination resonance at acceptors in crystals of InSb. Large spin orbit splitting of the hole band and the absence of an inversion center, characteristic of these crystals, must lead to high intensity of combination resonance. The angular diagrams indicate marked anisotropy of the resonance. A Hamiltonian is set up, and it is found that, at parameter values corresponding to InSb, combination resonance is determined chiefly by the nonrelativistic cubic members of the Hamiltonian. Determination of the intensity

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ACCESSION NR: AP4013524

shows that in undeformed samples this intensity must exceed the intensity of paramagnetic resonance approximately by the sixth order. Therefore, high intensity of combination resonance in deformed samples should also be expected. "We thank G. Ye. Pikus and G. L. Bir for valuable discussions and for furnishing a preprint of the article of G. L. Bir, Ye. I. Butikov, and G. Ye. Pikus (Phys. Chem. Sol. 25, no. 12, 1963)." Orig. art. has: 20 formulas.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors AN UkrSSR)

SUBMITTED: 18Sep63 DATE ACQ: 03Mar64 ENCL: 00

SUB CODE: EC, SS NO REF SOV: 009 OTHER: 006

Card 2/2

RASHBA, E.I.; SHEKA, V.I.

Combined resonance on local centers with a large radius. Fiz. tver. tela 6 no.1:141-152 Ja '64. (MIRA 17:2)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

RASHBA, E.I.

Determining stresses in massive structures due to their own weight allowing for the order of erection. Sbor.trud.Inst.stroi. mekh.AN URSR no.18:23-27 '53. (MLRA 9:8)
(Structures, Theory of) (Strains and stresses)

[illegible]

FD-3215

USSR/Physics - Semiconductors

Card 1/1 Pub. 153-24/28

Authors : Rashba E. I. and Tolpygo K. B.

Title : Static volt-ampere characteristic of the stopping layer formed on the boundary of electron and hole semiconductors in the reverse direction.

Periodical : Zhur. Tekh. Fiz., 25, No 7, 1335-1338, 1955

Abstract : Attempt is made to improve known relations on rectification by semiconductors with (p - n) transitions. Criticized are results by W. Shockley (Bell Syst. Tech. J., 28, 435 (1949)) and by A. I. Gubanov (ZhTF, 22, 381, (1952)). Indebted for initiative to Prof. V. Ye. Lashkarev.

Institution: --

Submitted : March 28, 1955

USSR, Physics - Semiconductors FD-242

Card 1/2 Pub. 153 - 17/19

Author : Rashba, E. I.

Title : Volt-ampere characteristics of electron-hole transition for small signal

Periodical : Zhur. tekh. fiz., 25, No 9 (September), 1955, 1663-1667

Abstract : Investigation of the volt-ampere characteristics of p-n transition at small variable voltage imposed upon constant inverse displacement permits one to obtain a number of new data on the structure of the transitional region and on the properties of a semiconductor on both sides of the p-n transition, and is essential for understanding of the operation of collector of crystal triodes. The author discusses deficiencies of W. Shockley's work (Bell Syst. Techn. J., 28, 1949) on this problem, and notes that B. M. Vul (DAN SSSR, 96, 257, 1954) determined by static calculation the charged capacity of p-n transition with arbitrary distribution of admixtures in the case of the formation of considerable space charge but did not fully investigate the problem of total capacity. A. I. Gubanov (ZhTF, 22, 1803, 1952 and 22, 1814, 1952) studied semiconductors of the type Cu_2O with weakly ionized admixture levels, whereas in the expounded theory the admixture is considered as practically completely ionized in applications to semiconductors of the germanium type. In the present work the author generalizes the static system of equations of K. B. Tolpygo and I. G. Zaslavskaya (ZhTF, 25, 955, 1955). He thanks V. Ye. Lashkarev, Active Member

Card 2/2 FD-3142

of Academy of Sciences of Ukrainian SSR, and K. B. Tolpygo for posing the subject and guidance. Eight references: Rashba, E. I., Trudy Inst. fiz. AN USSR [Work of the Institute of Physics, Acad. Sci. Ukr. SSR], No 7, 1955; K. B. Tolpygo and E. I. Rashba, ZhTF, No 7, 1955.

Institution : --

Submitted : April 28, 1955

RASHBA, E. I.
Acad Sci Ukrainian SSR. Inst of Physics

RASHBA, E. I.- "The theory of exitons in molecular crystals." Acad Sci Ukrainian SSR. Inst of Physics. Kiev, 1956.
(Dissertation for the Degree of Candidate of Physicomathematical Sciences)

SO: Knizhnaya Letopis' No. 13, 1956

~~RASBA, E.F.~~ RASHBA, E.I.

1-FW 3

Rašba, E. I. Treatment of points near the contour in using finite difference equations approximating the biharmonic differential equation. Akad. Nauk Ukrain. RSR. Prikl. Meh. 2 (1956), 210-216. (Ukrainian. Russian summary)

The finite difference equation used in the computation of approximate solutions of a biharmonic equation involves for each point the values of the function in 12 neighboring points of the net. For points near the boundary some of these neighboring points lie outside the region; different authors use different interpolations for such points involving the value of the function in one point of the region and the value of the normal derivative in a boundary point. The author proposes to use a more exact interpolation involving the values at 4 points of the region, and gives a numerical example in which the exact solution is known and in which his method is seen to give a much better approximation than two other methods. *G. Y. Rainich* (Ann Arbor, Mich.).

1/1

RASHBA, E.I.; TOLPYGO, K.B.

Theory of the photoelectric method for determining the lifetimes of current carriers in semiconductors. Agrobiologiia no.5:29-43 S-O '56. (MLRA 9:11)

1. Institut Fiziki Akademii nauk URSR.
(Semiconductors) (Electrons) (Photoelectric measurements)

RASHBA, E.I.

Reciprocal static characteristics of electron hole transitions
Trudy Inst.fiz.AN URSR no.7:60-77 '56. (MLRA 9:8)
(Semiconductors) (Electrons)

RASHBA, E.I.

Volt-ampere characteristics of electron hole transitions for small variable signals superimposed on direct back bias. Trudy Inst.fiz.AN URSR no.7:78-96 '56. (MLRA 9:8)
(Crystal detectors) (Semiconductors) (Electrons)

RASHBA, E.I.

21

537.311.33

21 2205. DIFFUSION OF CURRENT CARRIERS IN A SEMICONDUCTOR IN THE PRESENCE OF AN EXTERNAL ELECTRIC FIELD.

E.I.Rashba.

Zh. tekh. Fiz., Vol. 26, No. 7, 1415-18 (1956). In Russian.

Exact expressions for the distribution of photoholes in the presence of a uniform field are derived for the case of point and line illumination. Filamentary and semi-infinite geometries are considered and both volume and surface recombination are taken into account. It is suggested that the volume lifetime and surface recombination velocity may be determined by two measurements of photodecay, one with no field and one with a large field.

J.B.Arthur

SH

RASHBA, E.I.

4

621.314.63 2933

The Forward Voltage/Current Characteristic of a Junction-Type Rectifier for Large Currents.—E. I. Rashba & K. B. Tolpygo. (Zh. ~~tekh. Fiz., July 1956,~~ Vol. 26, No. 7, pp. 1419–1427.) A theoretical discussion is presented, in which an equation is derived for the voltage/current characteristic of a *p-n* junction-type diode of arbitrary thickness for large currents, on the assumption that the barrier layer is flooded with carriers and that the main voltage drop occurs in the bulk of the semiconductor. A numerical example showing the application of the equation to a germanium diode is included, and the accuracy of the method proposed is estimated.

MT

~~Rashba, Ye.I.~~ RAŠHBA, E.I.

CARD 1 / 3 PA - 1814

SUBJECT USSR / PHYSICS
AUTHOR GLINČUK,K.D., KISELJUK,E.G., RASBA, E.I.
TITLE The Measuring of the Recombination Velocity of Carriers by Conductivity Modulation.
PERIODICAL Žurn.techn.fis, 26, fasc.12, 2607-2613 (1956)
Issued: 1 / 1957

Though the photoelectric method of measuring the life τ of non-basic carriers is today mostly used, it has considerable disadvantages, as e.g.: difficulties when measuring too short diffusion lengths L; the method is applicable only if the local concentration of carriers changes only little; insufficient accuracy; not practicable when measuring τ in the hole-material. A much more serviceable method of measuring τ is that by conductivity modulation on the occasion of the illumination of the sample. Unlike the first method, life is here determined by one single measurement. The geometric criteria are considerably more simple and the method may also be applied for the hole material. At first the theory of the method is dealt with. A homogeneous semiconductor sample of cylindrical form is investigated. Formulae for the modulation of the conductivity of the semiconductor on the occasion of illumination and in consideration of surface- and volume recombination are derived. If the volume life τ is short and if the velocity of surface recombination is not too high, so that $\frac{sL}{\delta} \ll 1$, then $\tau_{eff} = \tau$, and it is possible by this method to measure τ_p (s is the velocity of surface recombination, δ is the diffusion coefficient, p - hole concentration). If it is true that $\frac{sL}{\delta} \gtrsim 1$, it is possible to find τ_p, if s is known. Inversely, if τ_p is known it is

Žurn.techn.fis,26, fasc.12, 2607-2613 (1956) CARD 3 / 3 PA - 1814

s was determined according to the formula $s = \frac{\tau_p - \tau_{eff}}{\tau_{eff}} \frac{\delta}{L_p}$ and compared with the result obtained by means of the photoelectric method. Values of from $\sim 600 \div 2500$ cm/sec were obtained for s. The same method was applied on other surfaces, on which occasion values of from 10 000 to 30 000 cm/sec were obtained for s.

INSTITUTION: Physical Institute of the Academy of Science of the Ukrainian SSR, Kiev.

RASHBA, E. I.

PRIKHOT'KO, A. F.

24(7) p 3 PHASE I BOOK EXPLOITATION SOV/1365

L'vov. Universytet

Materialy X Vsesoyuznogo soveshchaniya po spektroskopii. t. 1: Molekulyarnaya spektroskopiya (Papers of the 10th All-Union Conference on Spectroscopy. Vol. 1: Molecular Spectroscopy) [L'vov] Izd-vo L'vovskogo univ-ta, 1957. 499 p. 4,000 copies printed. (Series: Its: Fizychnyy zbirnyk, vyp. 3/8/)

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po spektroskopii. Ed.: Gazer, S.L.; Tech. Ed.: Saranyuk, T.V.; Editorial Board: Landsberg, G.S., Academician (Resp. Ed., Deceased), Neporent, B.S., Doctor of Physical and Mathematical Sciences, Fabelinskiy, I.L., Doctor of Physical and Mathematical Sciences, Fabrikant, V.A., Doctor of Physical and Mathematical Sciences, Kornitskiy, V.G., Candidate of Technical Sciences, Rayskiy, S.M., Candidate of Physical and Mathematical Sciences, Klimovskiy, L.K., Candidate of Physical and Mathematical Sciences, Miliyanchuk, V.S., Candidate of Physical and Mathematical Sciences, and Glauberman, A. Ye., Candidate of Physical and Mathematical Sciences.

Card 1/30

Deygen, M.F. Theory of Light Absorption by Impurity Centers in Homeopolar Crystals 135

Deygen, M.F., and V.L. Vinetskiy. Optical Properties of F_2^+ -centers in Ionic Crystals 137

Rashba, E.I. Impurity Absorption in Molecular Crystals 140

Kats, M.L. Absorption Spectra of Some Solid Solutions and Their Change When Subjected to Hard Radiation 141

Grum-Grzhimaylo, S.V., B.N. Grechushnikov, and R.A. Kravchenko-Berezhnoy. Vibrational Structure in the Absorption Spectrum of Corundum Tinted With Vanadium (at 100°K) 144

Slavnova, Ye. N. Spectrophotometric Study of Dye Impurities in Crystals of Lead and Barium Nitrites 146

Card 10/30

RASHBA, E. I.

3-

[illegible] TERACTION OF ELECTRON [illegible]

[illegible]

RASHBA, E.I.

Theory of strong interaction of electron excitations with lattice vibrations in molecular crystals. Part 2. Opt. i spektr. 2 no.1: 88-98 Ja '57. (MLRA 10:2)

1. Institut fiziki AN Ukrainskoy SSR.
(Crystal lattices) (Electrons)

RASHBA, E.I.

5
4E4j

The nature of the fine structure in the optical spectra of
cadmium sulfide crystals. V. L. Broude, V. V. Eremenko,
and E. I. Rashba. *Ukrain. Fiz. Zhur.* 2, 96(1957).—A
monocrystal of CdS of 0.1 X 0.0015 mm. dimensions showed
at 20°K. 10 narrow absorption bands in the region from
20,400-20,000 cm.$^{-1}$, but only at 20,585 cm.$^{-1}$ could both
components of the spectrum be observed. Since treatment
with HCl changes this band, it is concluded that this one is
not due to the absorption by the ideal lattice, but rather to
defects, at which a no. of excitons are located. W. J.

MT

Rashba, E. I.

Distr: 4E3d/4E4c

6
2

Light absorption in molecular crystals at weak interaction between excitons and phonons. A. S. Davydov and E. I. Rashba. *Ukrain. Fiz. Zhur.* 2, 225-40(1957).—The fundamental absorption spectra of mol. crystals were investigated mathematically for the case of such weak interaction that the electronic transition is accompanied by the generation or absorption of one phonon. The calcns. were first made for linear chains, then extended to 2- and 3-dimensional crystals with arbitrary structure where the law of interaction between mols. still would hold true. The absorption intensity distribution was detd. for the background, if exciton interaction occurs with the optical and the acoustical crystal vibrations. The background contours depend essentially on the no. of dimensions of the crystal structure. If the width of the exciton band $\Delta\epsilon$ is of the same order or greater than the av. phonon energy $h\nu$, then the displacement of the background max. with respect to the line of nonphonon transitions depends essentially on the structure of the exciton band and such max. never coincide with the boundary frequencies of the lattice vibrations; interaction with one vibration branch can lead to the simultaneous appearance of several background max. If $\Delta\epsilon \ll h\nu$ the sepn. of the satellites in one-dimensional chains can in certain cases coincide with the boundary frequencies. On the other hand, max. displacements in 3-dimensional crystals always correspond to certain intermediate values of vibration frequencies. Therefore, the shifting of the background max. in the spectra of the mol. crystals cannot be compared with the vibrations found from Raman dispersion (the Gross' frequencies). This conclusion is confirmed by the expt. Werner Jacobson

RASHBA, E.I.

Absorption by impurities in molecular crystals. Fiz. sbor. no.3: 140-141 '57. (MIRA 11:8)

1. Institut fiziki AN USSR.
(Crystals--Optical properties) (Absorption of light)

RASHBA, E.I.

2

Bipolar diffusion of current carriers in the presence of deep traps. K. B. Tolpygo and E. I. Rashba. *Soviet Phys. JETP* 4, 213-16(1957)(English translation); *Zhur. Eksptl. i Teoret. Fiz.* 31, 273-7(1956); cf. *C.A.* 50, 2270g.—The validity of the linear recombination law is investigated, by taking into consideration the dependence of minority carrier lifetime on the concn. of deep traps. An equation is derived for the concn. distribution of minority carriers that obey a nonlinear recombination law. Gerald D. Potter

MT

RASHBA, E.I.

51-5-4/26

AUTHOR: Rashba, E.I.

TITLE: A Theory of Impurity Absorption of Light in Molecular Crystals. (Teoriya primesnogo pogloshcheniya sveta v molekulyarnykh kristallakh)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.2, No.5, pp. 568 - 577 (USSR).

ABSTRACT: When complex organic molecules are introduced as impurities into organic molecular crystals, the impurity and the intrinsic absorption spectra usually overlap. Frequently, even the long-wavelength lines of the impurity spectrum are near the edge of the intrinsic absorption. In these conditions, strong, and possessing intense dichroism, intrinsic absorption may alter the intensity and polarisation of the impurity absorption. This effect is studied in the present paper for the case of crystals with undisplaceable molecules when it is not masked by the interaction of electron-excitation with lattice vibrations.

A molecular crystal is discussed in which one or several molecules are replaced by impurity molecules. It is assumed that one energy level of the impurity molecules and one energy level of the solvent molecules lie comparatively close to one another, and are separated by a wide gap from all the other

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51-5-4/26

Theory of Impurity Absorption of Light in Molecular Crystals.

levels. The Heitler-London method is used and anti-symmetrised products of all possible inter-molecular wave functions were chosen as the basis of calculations. Probabilities of optical transitions are calculated from the resolvent of the Hamiltonian of the crystal with subsequent application of a Bateman formula without using the wave functions of the excited states of the crystal. The formulae in equations (6), (7), (10) and (12) permit, without first obtaining the appropriate functions, discussion of some effects connected with the replacement of the solvent molecules by those of the impurity, e.g. intensity and polarisation of the impurity absorption, change of the latter on formation of impurity centres, effect of the dissolved molecules on the intrinsic absorption spectrum, etc. The results obtained show that in a crystal with undeformed lattice, the polarisation and intensity of the impurity absorption depend on the distance between the lines of the impurity and the intrinsic absorptions. On approach of the impurity level to the edge of the exciton band, the impurity line is intensified if $\vec{k} = 0$ describes the band edge, and it is damped in other conditions. The conditions when the impurity absorption

Card 2/3

51-5-4/26

A Theory of Impurity Absorption of Light in Molecular Crystals.

may be strongly polarised along the crystal axes are also given. The author discusses crystals with one molecule and with two molecules in a unit cell. In the former case, he deals with molecular chains as well as three-dimensional molecular crystals. The paper is entirely mathematical.
There is 1 appendix (mathematical proof of the equation (17) and 9 references, of which 8 are Slavic.

ASSOCIATION: Institute of Physics of the Ac.Sc. Ukrainian SSR, Kiyev. (Institut Fiziki AN USSR, g. Kiyev.)

SUBMITTED: October 22, 1956.

AVAILABLE: Library of Congress.

Card 3/3

RASHBA, E. I.

51-6-4/25

AUTHOR: Rashba, E. I.

TITLE: Absorption of Light and Luminescence in Molecular Crystals in the Case of Strong Interaction of Intramolecular Excitations with Phonons. (Pogloshcheniye sveta i lyuminestsentsiya v molekulyarnykh kristallakh pri sil'noy svyazi vnutrimolekulyarnykh vozbuzhdeniy s fononami.)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol. III, Nr. 6, pp. 568-578. (USSR)

ABSTRACT: The present author generalized (Refs.1, 2) the exciton theory of molecular crystals put forward by A.S. Davydov (Ref.3) to the case of strong interaction of intramolecular excitations with phonons and strong resonance interaction between molecules. It was shown in Ref.2, that if the coupling of intramolecular excitation with phonons is sufficiently strong, a new class of excited states appears. These are called deforming excitations. These states are characterized by a considerable local deformation

Card 1/3

51-6-4/25

Absorption of Light and Luminescence in Molecular Crystals in the Case of Strong Interaction of Intramolecular Excitations with Phonons.

of the lattice, and a strong effect of this deformation on the nature of motion of intramolecular excitations in the crystal. For fixed deformation the intramolecular excitation remains in a definite region of the crystal. The present paper, which is entirely theoretical, discusses absorption spectra and luminescence of crystals in the presence of deforming excitations. The paper also discusses certain properties of localized excitations. The band structure of the energy spectrum of excited states is investigated. The effective masses of deforming and localized excitations are estimated. Integral absorption in each of the spectrum components was found to be determined by the orientation of the dipole of the intramolecular transition, and does not depend on the strength of the exciton-phonon coupling or on the nature of the excited states produced by this coupling. Polarization of integral luminescence, on the other hand, depends on the nature of the excited states in

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51-6-4/25

Absorption of Light and Luminescence in Molecular Crystals in the Case of Strong Interaction of Intramolecular Excitations with Phonons.

the crystal. In particular, polarization of the luminescence of deforming excitation may differ from that given by the oriented gas model. The nature of the absorption edge due to deforming excitations is discussed, as well as the curve of luminescence of these excitations. An appendix gives certain properties of eigenfunctions of a plane harmonic oscillator. There is 1 figure and 10 references, of which 8 are Russian, and 2 English.

SUBMITTED: February 16, 1957.

AVAILABLE: Library of Congress.

Card 3/3

RAShbA, E.I

PA - 2341

AUTHOR: RASHBA, E.I.

TITLE: The Interaction of Exitons with a Molecular Lattice. (Vzaimodeystviye eksitonov s molekulaysnoy rechetkoy, Russian).

PERIODICAL: Izvestiia Akad. Nauk SSSR, Ser. Fiz., 1957, Vol 21, Nr 1, pp 37 - 47 (U.S.S.R.)

Received: 4 / 1957 Reviewed: 5 / 1957

ABSTRACT: In spite of all successes of the theory of the free exitons, several aspects of the theory with strong exiton-phonon binding have to be investigated. The solution of this problem is simplified by the fact that the methods developed in the polaron theory may be applied.

The claasification of the excited states of the crystal: In the threedimensional molecular crystals the alternative between the production of free exitons and the deforming excitations is lacking. On the occasion of strong interaction between exitons and phonons the minima on the energy surfaces are missing which correspond to the free exitons and the deforming excitations.

The deforming exitons in molecular chains: The spectra of selfconsisting states in the molecular crystals and chains are distinguished sharply from each other. The transition of an exiton into a deforming state takes place on the occasion of a monotonous decrease of energy and is not required in thermal fluctuations.

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PA - 2341

The Interaction of Exitons with Molecular Lattice.

Next, the structure of the zone of the spectrum of deforming exitons and the localized excitations are discussed.

The optical transitions in molecular crystals: If deforming excitations are formed in the crystal, the absorption spectrum will be rather complicated. Here the narrow band of the free exiton is superimposed over the broad-band absorption which is due to the deforming excitations. The same applies also for the luminescence spectrum. In conclusion "light" exitons in molecular chains are discussed. (1 illustration)

ASSOCIATION: Physical Institute of the Academy of Science in the Ukrainian SSR
PRESENTED BY:
SUBMITTED: -
AVAILABLE: Library of Congress.

Card 2/2

[illegible], E. I.

57-27-7-5/40

AUTHORS: Rashba, E. I., Mosar', A. I.

TITLE: Volt-Ampere Characteristics of Strong Semiconductor-Rectifiers (Vol'tampernyye kharakteristiki moshchnykh poluprovodnikovykh vypryamiteley)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1957, Vol. 27, Nr 7, pp. 1431 - 1445 (USSR)

ABSTRACT: The concentration distribution was investigated in carriers of both signs in flat semiconductor-rectifiers of types p-i-n and p-n-n at high direct-current intensities, where the concentration of carriers essentially differs from their equilibrated values, for diodes of various thickness in the case of a nonomolecular- and a bimolecular-recombination. The dependence of the hole-injection-coefficient γ_1 through the p-n-transition and of the coefficient γ_2 of the "filtration" into the rear electrode of the current are investigated. In the case of a bimolecular recombination γ_1 and γ_2 in a wide amperage range keep their boundary values ($\gamma_1 \simeq 1$ and $\gamma_2 \propto 0$) and the volt-ampere characteristic in the case of sufficiently thin diodes is $i \sim \exp(eV/kT)$. In the case of a nonomolecular recombination the decrease in γ_1 and the increase in γ_2 begins con-

Card 1/2

57-27-7-5/40

Volt-Ampere Characteristics of Strong Semiconductor-Rectifiers

siderably earlier and the volt-ampere characteristic for thin diodes improves by changing over from $i \sim \exp(eV/2kT)$ to a dependence on the form $i \sim \exp(eV/kT)$. It is shown that the usual sharp break in the straight branch of the characterisitc curve at high current intensities is connected with the increase in the spatial voltage drop in a highly resistive domain. In bimolecular recombinations it still sets in in the domain of the good injection. In monomolecular recombinations, however, the increase in the spatial voltage drop is connected with the decrease in γ_1 and the increase in γ_2. There are 6 figures and 13 references, 7 of which are Soviet.

ASSOCIATION: Institute of Physics, Ukrainian SSR, Kiyev
(Institut fiziki AN USSR, Kiyev)

SUBMITTED: February 16, 1957

AVAILABLE: Library of Congress

1. Semiconductor-rectifiers-Electrical properties-Test results
2. Semiconductors-Electrical properties

Card 2/2

20-114-3-19/60

AUTHORS: Broude, V. L., Yeremenko, V. V., Rashba, E. I.

TITLE: The Absorption of Light by CdS-Crystals (Pogloshcheniye sveta kristallami CdS)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 114, Nr 3, pp 520-523 (USSR)

ABSTRACT: The authors investigated the spectra of the monocrystals of the hexagonal modification of CdS at 20,4°K in polarized light. The samples were produced by evaporation of Cd and S in an argon-atmosphere, by evaporation of Cd in a $H_2S + H_2$-atmosphere and by evaporation of CdS (recrystallization). Samples with different boundaries and surface finish were investigated and the thickness of the samples varied between 1 and 100 . The spectra were investigated by a polarization-microprojector. Two components of the spectrum which correspond to the polarization of the light vector along the hexagonal axis and vertical to it were simultaneously fixed on the photo-plate by the use of a crystal or Iceland spar. The scheme of the absorption spectrum of the CdS-crystal in polarized light is illustrated by a diagram. The spectrum contains 10 rather narrow bands (in the interval 20400 - 20600 cm^{-1}) and some

Card 1/3

20-114-3-19/60

The Absorption of Light by CdS-Crystals

PRESENTED: January 7, 1957, by G. S. Landsberg, Member of the Academy (Deceased)

SUBMITTED: January 7, 1957

Card 3/3

RASHBA E.I.

AUTHORS: Lubchenko, A.F. and Rashba, E.I. 51-4-5-6/29

TITLE: Exciton States of a Molecular Crystal Containing Different Molecules (Ob eksitonnykh sostoyaniyakh molekulyarnogo kristalla, soderzhashchego razlichnyye molekuly)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol IV, Nr 5, pp 580-585 (USSR)

ABSTRACT: Davydov (Ref 1-3) developed a theory of absorption of light by molecular crystals and proposed a method of calculation of a number of split components and their polarization in absorption of light by crystals containing identical molecules. Another variant of this calculation method, which leads to the same final results, was described in Ref 4. The present authors extend the results of Refs. 1-4 to the case of the crystal whose unit cell contains different molecules and discuss the possible exciton states of such a crystal. The differences between molecules may be due to their chemical structure or due to the fact that they belong to symmetrically independent lattices. The possibility of superposition of molecular excitations with near eigenvalues of energy in states with k = o is investigated. It is shown that such a superposition

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51-4-5-6/29

Exciton States of a Molecular Crystal Containing Different Molecules.

occurs only when the representations of local groups, to which the internal molecular wave-functions belong, may be obtained by reduction of one representation of a factor-group. Several special cases are dealt with in detail. They are: (1) crystals with a lattice of the trans-azobenzene (C_6H_5N—NC_6H_5) type which belongs to the space group C_{2h}^{5}; (2) crystals with a C_{2h}^{4} lattice; (3) crystals of the silver perchlorate with benzene (C_6H_6—$AgClO_4$) type which belongs to space group V_h^{17}. The paper is entirely theoretical. The author thanks A.S. Davydov for advice. There are 7 tables and 8 references, 5 of which are Soviet and 3 American.

ASSOCIATION: Institut fiziki AN USSR (Institute of Physics, Academy of Sciences of the Ukrainian SSR)

SUBMITTED: July 8, 1957

Card 2/2

1. Light - Absorption - Theory 2. Crystals - Molecular excitation

AUTHORS: Lashkarev, V. Ye., ~~Rashba, E. I.,~~ SOV/57-28-9-1/33
Romanov, V. A., Demidenko, Z. A.

TITLE: Kinetics of Some Electronic Processes in Semiconductors (Kinetika nekotorykh elektronnykh protsessov v poluprovodnikakh)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, [illegible], Vol. 28, Nr 9, pp 1853-1870 (USSR)

ABSTRACT: This is an investigation of some electronic processes in semiconductors. It is postulated that the absorption of the light quantum leads to the production of a pair of electron holes in the same place in the crystal. This implies that the particular features connected with the possible participation of excitons in the development of photoconductivity are not taken into consideration. The kinetics of photoconductivity, of the bulk photo e.m.f., of the photomagnetic effect, and of the photoconductivity in semiconductors subjected to a magnetic field are investigated. Equations describing these effects are derived in linear approximation. After the kinetics of some electronic processes had been studied, the problems involved in the determination of

Card 1/3

the parameters of bulk and of surface recombination are discussed. In particular it is shown that a joint investigation of the kinetics of photoconductivity and of the photo e.m.f. facilitates a simple judgement on the occurrence of a carrier capture. The general formulae deduced are applied to the investigation of a number of sample cases. An experimental equipment incorporating a Kerr-cell was constructed. It permitted to make measurements in a wide range of temperature and frequency with a high accuracy. Experimental evidence bearing on the kinetics of photoconductivity and the volume e.m.f. is presented. It is then compared with theory. Ye.G. Miselyuk, A.N. Kvasnitskaya and N.B. Mertens made available the germanium samples.

There are 10 figures and 24 references, 18 of which are Soviet.

ASSOCIATION: Institut fiziki AN USSR, Kiyev (Institute of Physics, AS UkrSSR, Kiyev)

AUTHORS: E.I.Rashba, M.K.Sheynkman SOV/57-28-9-3/33

TITLE: Influence of Surface Recombination Upon the Kinetics of Photoconductivity in Semiconductors (Vliyaniye poverkhnostnoy rekombinatsii na kinetiku fotoprovodimosti v poluprovodnikakh)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, Vol 28, Nr 9, pp. 1883 - 1889 (USSR)

ABSTRACT: This is a study of the kinetics of photoconductivity in a semiconductor under the most simple premises with respect to the recombination mechanism intended to present a clear and illustrative explanation of the influence of surface recombination upon the course taken by photocurrent relaxation at different values of the light absorption factor. The surface recombination is essential even in the early stages of the photocurrent relaxation processes. In order to make this influence accessible to measurement the values T_0 are given at which β^* which is computed according to formula (3)is about 2/3 of β_0. β^* denotes the effective quantum yield and β_0 the real quantum yield. This report

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Influence of Surface Recombination Upon the Kinetics of Photoconductivity in Semiconductors SOV/57-28-9-3/33

covers an investigation of the spectral disribution of the stationary photocurrent, of the effective quantum yield and of the effective life which were recorded by methods described in publications. It is believed that the spectral dependence found in connection with the investigation of the quantum yield has a physical meaning and that it is not connected with the insufficiently short period during which the yield was measured. There is every indication that the CdS monocrystals actually exhibit such a real spectral dependence of quantum yield. V.Ye. Lashkarev, Member, Academy of Sciences, Ukr SSR proposed the subject for this study. V.Yu.Fedorchenko assisted in the calculations. There are 9 figures and 14 references, 13 of which are Soviet.

ASSOCIATION: Institut fiziki AN USSR Kiyev (Institute of Physics, AS UkrSSR, Kiyev)

SUBMITTED: December 6, 1957

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AUTHORS: Gribnikov, Z. S., Rashba, E. I. SOV/57-28-9-14/33

TITLE: **Effect of a Nonuniform** Electric Field on Exiton Diffusion (Vliyaniye neodnorodnogo elektricheskogo polya na diffuziyu eksitonov)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, /Vol. 28, Nr 9, pp. 1948-1958 (USSR)

ABSTRACT: This paper starts out from the diffusion equations which take into account the influence of a given heterogeneous electric field on the exitons. Two cases are considered: that of a rapid decrease of the field and that of a gradual decrease. An exact solution is given for an exponential field and for a linear field confined to the surface. The information presented leads to the following conclusions: If the exiton moves in a **nonuniform** electric field it is drawn into the domain of the strong field due to the generation of an induced dipole moment. If an exiton carries a constant dipole moment, it is either attracted towards the strong field or it is ejected by it. This paper also includes a treatment of the diffusion equation incorporating terms which describe the **effect of a nonuniform electric field upon**

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Effect of a Nonuniform Electric Field on Exiton Diffusion

the exitons in the domain of the zonal curvature on the surface in a number of cases. If the curvature of the electron zones at the surface is given the effect of the modification of the limit concentration of the exitons increases with the growing rate of field decrease in the interior of the sample. There is no indication that, as a rule, it is possible to take into account the influence of the zonal curvature upon the effective life of the exitons by a re-normalization of the rate of the surface recombination, which would lead to a modification of its spectral distribution. This effect is of considerable importance at low temperatures. V. Ye. Lashkarev, Member, Academy of Sciences, AS UkrSSR discussed the results with the authors. There are 15 references, 10 of which are Soviet.

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1. Institut fiziki AN USSR, Kiyev.
(Semiconductors)